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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SAVLA, ARPAN P	

ART UNIT	PAPER NUMBER
2185	

DATE MAILED: 10/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/772,822	RAJAN ET AL.	
	Examiner	Art Unit	
	Arpan P. Savla	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *16-18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15,19 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-20* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :12/7/04, 6/27/05, 7/14/05, 1/10/06.

DETAILED ACTION

Election

During a telephone conversation with Shanen Delaney on September 29, 2006 a provisional election was made without traverse to prosecute the invention of "System and Method for LUN Cloning", Group I, claims 1-15 and 19-20. Affirmation of this election must be made by applicant in replying to this Office action. Claims 16-18 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-15 and 19-20, drawn to loading data blocks to and from direct storage devices, classified in class 711, subclass 112.

II. Claims 16-18, drawn to generating a particular pattern of data blocks, classified in class 711, subclass 217.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because generating data blocks does not

require the data blocks to be loaded from a disk into a memory. The subcombination has separate utility such as virtual backup.

The examiner has required restriction between combination and subcombination inventions. Where applicant elects a subcombination, and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Also, because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

The instant application having Application No. 10/772,822 has a total of 20 claims pending in the application, there are 5 independent claims and 15 dependent claims, all of which are ready for examination by the Examiner.

INFORMATION CONCERNING OATH/DECLARATION

Oath/Declaration

1. Applicant's oath/declaration has been reviewed by Examiner and is found to conform to the requirements prescribed in 37 CFR 1.63.

INFORMATION CONCERNING DRAWINGS

Drawings

2. Applicant's drawings submitted February 5, 2004 are acceptable for examination purposes.

ACKNOWLEDGMENT OF REFERENCES CITED BY APPLICANT

Information Disclosure Statement

3. As required by MPEP § 609(c), Applicant's submission of the Information Disclosure Statements dated December 27, 2004, June 25, 2005, July 14, 2005, and January 10, 2006 are acknowledged by Examiner and some of the cited references have been considered in the examination of the claims now pending. As required by MPEP § 609 c(2), a copy of the PTOL-1449 initialed and dated by Examiner is attached to the instant Office action.

4. The first reference of the second page of the IDS dated December 27, 2004 has not been considered by the Examiner because it does not include at least the month and year of publication. See MPEP §609.04(a)(I).

5. References 31, 38, 41, and 67 of the IDS dated June 27, 2005 have been considered by the Examiner because they do not include at least the month and year of publication. See MPEP §609.04(a)(I).

6. Reference 16 of the IDS dated July 14, 2005 has not been considered by the Examiner because it does not include at least the month and year of publication. See MPEP §609.04(a)(I).

7. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

OBJECTIONS

Claims

8. **Claim 3** is objected to because the claim recites the limitation "the unaltered data content" in lines 2-3, however, there is insufficient antecedent basis for this limitation in the claim. Applicant may consider amending the claim to read "an unaltered data content."

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. **Claims 1-15 and 19-20 are rejected under 35 U.S.C. 103(a) as being obvious over Haskin et al. (U.S. Patent Application Publication 2003/0158863) in view of Wang-Knop et al. (U.S. Patent 6,571,261).**

11. **As per claim 1**, Haskin discloses a method for separating data blocks referenced by a writeable virtual disk (vdisk) from data blocks referenced only by a backing store of a system, the method comprising the steps of:

loading blocks of the writable vdisk from a disk into a memory, the loaded blocks including a writable vdisk indirect block having a plurality of fields, each field storing a valid pointer to a data block or an invalid pointer representing a hole (paragraph 0053; paragraph 0063; Fig. 2B);

loading blocks of the backing store from a disk into memory, the loaded blocks including a backing store indirect block having a plurality of fields, each backing store indirect field corresponding to a field of the writable vdisk indirect block, one or more backing store indirect block fields having a pointer to a data block (paragraph 0053; paragraph 0095; Fig. 8D); *It should be noted that the "snapshot data set" is analogous to the "backing store."*

replacing each field having a hole in the writable vdisk indirect block with a new pointer to the data block referenced by the corresponding backing indirect field (paragraph 0081). *It should be noted that "updating" the original file system creates "holes" (i.e. invalid pointers) which are replaced by providing "ditto disk addresses" within the snapshot dataset.*

Haskin does not expressly disclose searching each field of the writable vdisk indirect block for a hole.

Wang-Knop discloses searching each field of the writable vdisk indirect block for a hole (col 7, lines 10-53; Figs. 5 and 6).

Haskin and Wang-Knop are analogous art because they are from the same field of endeavor, that being file systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Wang-Knop's defragmentation utility within Haskin's file system snapshot.

The motivation for doing so would have been to provide a defragmentation utility that works online, avoids locking data structures for long periods of time, is memory efficient, uses sub-blocks for fragment analysis and migration, as well as minimizes data movements (Wang-Knop, col. 3, lines 23-27).

Therefore, it would have been obvious to combine Haskin and Wang-Knop for the benefit of obtaining the invention as specified in claim 1.

12. **As per claim 2**, the combination of Haskin/Wang-Knop discloses the step of replacing comprises the step of:

dirtying the data block pointed to by the backing store indirect block to enable write allocation of the dirty data block without altering a data content of the data block (Haskin, paragraph 0079). *It should be noted that replacing the address of the allocated block is in effect "dirtying" the block without altering the content.*

13. **As per claim 3**, the combination of Haskin/Wang-Knop discloses the step of replacing further comprises the step of:

choosing a new pointer for a newly allocated data block containing the unaltered data content (Haskin, paragraph 0081); *It should be noted that the "ditto disk address" acts as the "new pointer" for the newly allocated indirect block.*

setting bits in block allocation structures for the newly allocated data block (Haskin, paragraph 0058). *It should be noted that the "block allocation map" is analogous to the "block allocation structures."*

placing the new pointer to the newly allocated data block into the field of the writable vdisk indirect block to replace the hole (Haskin, paragraph 0081). *It should be noted that "storing" is analogous to "placing."*

14. **As per claim 4**, the combination of Haskin/Wang-Knop discloses freeing the dirty data block (Haskin, paragraph 0177); *It should be noted that "deleting" is analogous to "freeing."*

writing the newly allocated data block to disk (Haskin, paragraph 0177). *It should be noted that "flushing disk access buffers to disk" is analogous to "writing to disk."*

15. **As per claim 5**, the combination of Haskin/Wang-Knop discloses releasing an association of the writable vdisk to the backing store to thereby separate the writable

disk data blocks from the backing store data blocks (Haskin, paragraph 0112). *It should be noted that by "deleting" the snapshot it follows that all associations with the original file system are "released."*

16. **As per claim 6**, the combination of Haskin/Wang-Knop discloses the pointers contained in the writable vdisk indirect block fields and the backing store indirect block fields comprise logical block numbers (VBNs) (Haskin, paragraph 0096).

17. **As per claim 7**, the combination of Haskin/Wang-Knop discloses the invalid pointers contained in the writable vdisk indirect block fields comprise a zero logical volume block number (VBN) (Haskin, paragraph 0072). *It should be noted that "null" values for the disk addresses indicate unallocated blocks, thus, it follows that unallocated blocks have invalid pointers.*

18. **As per claim 8**, the combination of Haskin/Wang-Knop discloses the plurality of fields in the writable vdisk indirect block are a writable vdisk level 1 buffer and the plurality of fields in the backing store indirect block are a backing store level 1 buffer (Haskin, paragraph 0055). *It should be noted that the "inodes" function as "level 1 buffers."*

19. **As per claim 9**, Haskin discloses an apparatus for separating data blocks referenced by a writeable virtual disk (vdisk) from data blocks referenced only by a backing store of a system, the apparatus, comprising:

a backdoor message handler adapted to load blocks of the writable vdisk and backing store from disk into the storage system (paragraph 0053); *It should be noted*

that Haskin's "computer processing device" (paragraph 0050) functions as a "backdoor message handler."

a writable vdisk indirect block in memory having a plurality if fields, each field storing a valid pointer to a data block or an invalid pointer representing a hole (paragraph 0063; Fig. 2B).

a backing store indirect block in the memory having a plurality if fields, each backing sotre indirect block field corresponding to a field of the writable vdisk indirect block, each backing store indirect block field having a pointer to a data block (paragraph 0095; Fig. 8D); *See citation note for the similar limitation in claim 1 above.*

a write allocator for replacing each field representing a hole in the writable vdisk indirect block with a new pointer to the data referenced by the corresponding backing store indirect block field (paragraph 0081). *It should be noted that Haskin's "computer processing device" functions as a "write allocator." Also, see the citation note for the similar limitation in claim 1 above.*

Haskin does not expressly disclose a special loading function for searching each field of the writable vdisk indirect block for one or more fields representing a hole.

Wang-Knop discloses a special loading function for searching each field of the writable vdisk indirect block for one or more fields representing a hole (col 7, lines 10-53; Figs. 5 and 6). *It should be noted that Wang-Knop's "defragmentation utility" functions as a "special loading function."*

Haskin and Wang-Knop are analogous art because they are from the same field of endeavor, that being file systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Wang-Knop's defragmentation utility within Haskin's file system snapshot.

The motivation for doing so would have been to provide a defragmentation utility that works online, avoids locking data structures for long periods of time, is memory efficient, uses sub-blocks for fragment analysis and migration, as well as minimizes data movements (Wang-Knop, col. 3, lines 23-27).

Therefore, it would have been obvious to combine Haskin and Wang-Knop for the benefit of obtaining the invention as specified in claim 9.

20. **As per claim 10**, the combination of Haskin/Wang-Knop discloses the write allocator is further adapted to:

choose a new pointer for a newly allocated data block containing an unaltered data content (Haskin, paragraph 0081), set bits in block allocation structures for the newly allocated data block (Haskin, paragraph 0058), and place the new pointer to the newly allocated data block into the field of the writable vdisk indirect block to replace the hole (Haskin, paragraph 0081). *See the citation notes for claim 3 above.*

21. **As per claim 11**, the combination of Haskin/Wang-Knop discloses the write allocator is further adapted to:

free the dirty data block and write the newly allocated data block to disk (Haskin, paragraph 0177). *See the citation notes for claim 4 above.*

22. **As per claim 12**, the combination of Haskin/Wang-Knop discloses the backdoor handler loads blocks of writable vdisk and the blocks of the backing store during periods

of reduced processing activity (Haskin, paragraph 0053). *It should be noted that the blocks are loaded during periods other than when the blocks are being updated, thus when compared to periods of block updating, the loading periods have reduced processing activity.*

23. **As per claim 13**, the combination of Haskin/Wang-Knop discloses the pointers contained in the writable vdisk indirect block fields and the backing store indirect block fields comprise logical block numbers (VBNs) (Haskin, paragraph 0096).

24. **As per claim 14**, the combination of Haskin/Wang-Knop discloses the invalid pointers contained in the writable vdisk indirect block fields comprise a zero logical volume block number (VBN) (Haskin, paragraph 0072). *See the citation note for claim 7 above.*

25. **As per claim 15**, the combination of Haskin/Wang-Knop discloses the plurality of fields in the writable vdisk indirect block are a writable vdisk level 1 buffer and the plurality of fields in the backing store indirect block are a backing store level 1 buffer (Haskin, paragraph 0055). *See the citation note for claim 8 above.*

26. **As per claim 19**, Haskin discloses an apparatus for separating data blocks referenced by a writeable virtual disk (vdisk) from data blocks referenced only by a backing store of a system, comprising:

means for loading blocks of the writable vdisk from a disk into a memory, the loaded blocks including a writable vdisk indirect block having a plurality of fields, each field storing a valid pointer to a data block or an invalid pointer representing a hole

(paragraph 0053; paragraph 0063; Fig. 2B); *See the citation notes for the similar limitations in claims 1 and 9.*

means for loading blocks of the backing store from a disk into memory, the loaded blocks including a backing store indirect block having a plurality of fields, each backing store indirect field corresponding to a field of the writable vdisk indirect block, one or more backing store indirect block fields having a pointer to a data block (paragraph 0053; paragraph 0095; Fig. 8D); *See the citation notes for the similar limitation in claims 1 and 9.*

means for replacing each field having a hole in the writable vdisk indirect block with a new pointer to the data block referenced by the corresponding backing indirect field (paragraph 0081). *See the citation notes for the similar limitation in claims 1 and 9.*

Haskin does not expressly disclose means for searching each field of the writable vdisk indirect block for a hole.

Wang-Knop discloses means for searching each field of the writable vdisk indirect block for a hole (col 7, lines 10-53; Figs. 5 and 6). *See the citation notes for the similar limitation in claims 1 and 9.*

Haskin and Wang-Knop are analogous art because they are from the same field of endeavor, that being file systems.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to implement Wang-Knop's defragmentation utility within Haskin's file system snapshot.

The motivation for doing so would have been to provide a defragmentation utility that works online, avoids locking data structures for long periods of time, is memory efficient, uses sub-blocks for fragment analysis and migration, as well as minimizes data movements (Wang-Knop, col. 3, lines 23-27).

Therefore, it would have been obvious to combine Haskin and Wang-Knop for the benefit of obtaining the invention as specified in claim 19.

27. **As per claim 20**, the claim is rejected for the same reasons as cited in claim 1 above combined with Haskin's disclosure of a computer readable medium, including program instructions executing on a computer (Haskin, paragraph 0206-207).

Conclusion

STATUS OF CLAIMS IN THE APPLICATION

The following is a summary of the treatment and status of all claims in the application as recommended by MPEP 707.70(i):

CLAIMS REJECTED IN THE APPLICATION

Per the instant office action, **claims 1-15 and 19-20** have received a first action on the merits and are subject of a first action non-final.

RELEVANT ART CITED BY THE EXAMINER

The following prior art made of record and not relied upon is cited to establish the level of skill in Applicant's art and those arts considered reasonably pertinent to Applicant's disclosure. See MPEP 707.05(e).

1. U.S. Patent 6,618,794 (Sicloa et al.) discloses a system for generating a virtual point-in-time copy of a selected subset (e.g., a selected volume or logical unit) of a storage system.

2. U.S. Patent 6,907,505 (Cochran et al.) discloses a hybrid LUN copy operation that ultimately produces a full LUN copy but involves a transient snapshot-copy-like intermediate stage.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arpan P. Savla whose telephone number is (571) 272-1077. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on (571) 272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Arpan Savla
Art Unit 2185
September 29, 2006

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